

Aus beiden, also seinen mikrotechnischen Rathschlägen, wie seinen unerbetenen Correcturen, sucht Herr Br. die Berechtigung seines Vorgehens abzuleiten. Ob mit Recht, überlasse ich der Beurtheilung des geschätzten Leserkreises des Zoologischen Anzeigers.

Halle a./S., 16. Febr. 1901.

6. The Holothurians of the Pacific Coast of North America.

By Hubert Lyman Clark, Olivet College, Olivet, Michigan, U.S.A.

(With 14 figs.)

eingeg. 18. Februar 1901.

A small collection of Holothurians, numbering 52 specimens and representing at least 11 species, made near Pacific Grove, California, during the past summer (1900), has recently come into my possession, and has proved unusually interesting. It affords an opportunity for the review and revision of our knowledge of the Holothurians of the Pacific coast, which is notably imperfect. The first Holothurians recorded from this district were those collected at Sitka and described by Eschscholtz in 1829. This list includes only 2 species both of which were referred to the genus *Chirodota*, one being called *C. verrucosa* and the other *C. discolor*. The former of these has not been identified with any known species, while the latter name is generally applied to the common *Chiridota* of the Alaskan coast. In 1835, Brandt published an account of the animals collected by H. Mertens during a voyage around the world, and he described 7 Holothurians from Sitka, as follows: *Aspidochir Mertensii*, *Liosoma sitchaense*, *Cladodactyla albida*, *C. miniata*, *C. nigricans*, *Cuvieria sitchaensis*, and *Diploperideris sitchaensis*. In 1881, Ludwig revised Brandt's list: he regards *Aspidochir* as a *Chiridota* or *Synapta*, *Liosoma sitchaense* as synonymous with Eschscholtz' *Chirodota discolor*, the 3 species of *Cladodactyla* as valid species of *Cucumaria*, *Cuvieria sitchaensis* as identical with *Psolus Fabricii* D. & K., and *Diploperideris* as a species of *Stichopus*. An interesting point brought out by this revision is that not one of the generic names used by Brandt is now in good standing. In 1857, Stimpson published his valuable paper on Pacific coast Crustacea and Echinoderms, which included 12 species of Holothurians, of which *Liosoma arenicola* and *Holothuria californica* were described as new. He also includes *Pentacta frondosa* Gunner., which was reported from San Francisco by Ayres in 1855. In 1864, Stimpson published the description of 2 new Holothurians from Puget Sound, which he called *Pentacta populifer* and *piperata*. Ludwig regards the former as identical with *Cucumaria albida* of Brandt and the latter synonymous with

nigricans Brandt. In 1867, Selenka's well known monograph on Holothurians appeared, in which he gives 14 species from the Pacific coast, north of Mexico. He includes all of the species given by previous writers except *Pentacta populifer* and *piperata* Stimpson (which he mentions in an "Addendum") and he adds 2 new species, *Cucumaria quinquesemita* and *Synapta albicans*, both from the coast of California. He also describes and gives a figure of one of the calcareous plates of a *Cucumaria* which he refers to Brandt's *albida*. Ludwig in his revision of Brandt's list, places *albida* as a synonym of *populifer* Stimpson, while Selenka's *albida* he regards as a synonym of Brandt's *miniata*. According to Ludwig therefore there are 3 *Cucumarias* on the Pacific coast, as follows:

Cucumaria miniata (Brandt) = *albida* Selenka.

- *populifer* (Stimpson) = *albida* Brandt.

- *nigricans* (Brandt) = *piperata* Stimpson.

As I shall show, there is reason to doubt the identity of *albida* Selenka with *miniata* Brandt, and that may involve the standing of *populifer* Stimpson. In 1886, Théel's splendid work on Holothurians was published in the Challenger Reports. In it he includes the species given by Selenka but unites *Liosoma sitchaense* Brandt and *Chirodota discolor* Esch. into one species. And he adds a new one, *Cucumaria Chronhjelmi* from Vancouvers Island. In 1896, Columbia University sent a party of zoologists to Puget Sound to investigate the fauna of that region, and the following summer a second party supplemented their work. A general account of the collecting in 1896 was published in 1897 by the late N. R. Harrington, and in that account he speaks of 6 kinds of Holothurians; a "bronze-red *Cucumaria*", a "small white *Cucumaria*", a "white *Thyone*-like" species, a "species of *Synapta*", a *Psolus* and *Holothuria californica*. The collections brought home by the parties of both 1896 and 1897 contain only 4 species however, the *Synapta*, the *Psolus* and 2 species of *Cucumaria*. The *Synapta* is probably identical with Selenka's *albicans* and one of the *Cucumarias* is a representative of Théel's *Chronhjelmi*. The *Psolus* and the other *Cucumaria* are new species and have been named *Psolus chitonoides* and *Cucumaria lubrica*. The descriptions of these species is now in press.

We see from the foregoing review that up to the present time 16 species of Holothurians have been recorded from the Pacific coast but most of them have been described either so incompletely or from such scanty material that their positive identification at the present time is a matter of great difficulty. The collection before me from Pacific Grove sheds considerable light on some of the doubtful forms

and enables us to characterize some of the species more accurately than heretofore. There are 12 specimens of a *Synapta* which agree very closely in general appearance with the 2 above mentioned from Puget Sound. But they agree perfectly even in details with *Synapta inhaerens* from our Atlantic coast, so that I can find no ground on which to separate them from that species. This fact convinces me, after a careful study of Selenka's description, that his *albicans* in spite of the large number of digits on the tentacles, is not a distinct species and the name should be regarded as a synonym of *inhaerens*. This species is known on the eastern coast of the United States from South Carolina to Maine and in Europe from the Mediterranean to the Murman coast. Its occurrence therefore in Puget Sound and on the coast of California is a matter of considerable interest and hints at the probability of its being a circumpolar species extending southward to the Mediterranean, South Carolina and California.

The other 40 Holothurians are divided among 5 genera but, with the exception of 3 specimens of a large *Stichopus*, they are all Dendrochirotae. The *Stichopus* is of considerable interest because there can be little doubt that it is the species which Stimpson described as *Holothuria californica*. Mr. Benjamin Thomas, who collected and kindly sent me these specimens, tells me it is the commonest Holothurian at Pacific Grove and is known there as *Holothuria californica*. A comparison with Stimpson's description leaves no reasonable doubt that this is the species which was before him. Owing to his brief diagnosis, the species has received scant attention from later writers. Théel omits it from both his key and his tables of distribution, merely mentioning it as a "very incompletely known" species, while Ludwig in 1892 omits it altogether from his table of known species. It will be worth while therefore to mention here its distinguishing characters. Its position in the genus *Stichopus* is suggested by the flattened ventral surface and the large warts and papillae on the dorsal side, and is clearly proven by the arrangement of the genital gland in 2 tufts, one on each side of the mesentery. It reaches a length of over a foot and is dark brown in color. It is easily distinguished from other members of the genus by the remarkable calcareous deposite. In the outer layer of the body wall are large numbers of well developed tables, with discs which normally contain 4 central holes and 4 larger and 8 smaller ones around the margin; the spire terminates in 20—24 teeth and has one or two cross-bars. Underneath the tables is a layer of very numerous, long, thin buttons, usually with 9 pairs of holes. At the base of the tentacles and in the skin of the oral disc are numerous, slightly knobbed or branched rods, and there

are numerous somewhat similar rods as supporting rods of the tentacles. The pedicels however seem to have no other supporting rods, than the long buttons. The C-shaped bodies, such as are found in many species of *Stichopus* seem to be wanting.

The rest of the collection, the 37 *Dendrochirotae*, represent 1 species of *Psolus*, 1 of *Thyone*, 6 of *Cucumaria* and a new species representative of a new genus. There is a single, small red specimen of *Psolus*, which was taken in deep water at Cypress Point. It measures 12 mm long by 6 broad. The sole contains no reticulated cups like those of *Ps. Fabricii*, but only numerous knobbed buttons like those of *Ps. squamatus*. The specimen is too small to make its identification certain. It may be *Ps. japonicus* Östergren, but I am not sure that I understand the difference between that species and *Ps. squamatus*. The latter has not hitherto been recorded from any point nearer California than the Murman Coast but it seems wiser to refer this specimen to that species than to base a new species upon it.

Of the 30 specimens of *Cucumaria*, 14 represent a very small (15—20 mm long) black species from Cypress Point, which has not yet been described. It has however been the object of careful and long continued study by Mr. H. P. Cowles, tho his results have not yet been published. On account of its peculiar habit of brooding its eggs and young, he has given it the name *curata*. It is not known from any other locality than Cypress Point. There are 5 specimens of *Cucumaria Chronhjelmii* Théel, previously known from further north. There is a single small specimen of the Puget Sound species *C. lubrica*, referred to above. The specimens from Pacific Grove, of both these species are pure white, while those from Puget Sound were gray. In life, they are said to be white. Another species represented by a single small specimen (15 mm) is Stimpson's *C. calcigera*, hitherto known from the western Atlantic, the Arctic Ocean, and Behring's Sea. Its occurrence at Pacific Grove, like that of *Synapta inhaerens* and *Psolus squamatus* would seem to indicate a southern extension of the range of a circumpolar species.

The remaining *Cucumarias* represent at least 2 species, but 3 of the specimens are too small to be satisfactorily determined. They are obviously very young. One of the others is apparently an individual of the species which Selenka described as "*Cucumaria albida* Brandt". It is 75 mm long and is perfectly white, tho in life it is said to have been "yellowish with brown spots". The calcareous deposits are not abundant and agree exactly with Selenka's figure. The specimen moreover agrees with his descriptions except that there is only 1 Polian vessel and 1 stone-canal. All of the remaining specimens are small,

white *Cucumarias*, the largest 24 mm long. This largest one is said to have been *pinkish* in life, with *pink* tentacles. Besides the double row of pedicels on the ambulacra, these specimens all have scattered pedicels on the interambulacra. The calcareous deposits consist of very numerous, thick, knobbed, lenticular buttons, with about 12 perforations and most of them have one end drawn out as a spiny projection. These deposits resemble those of *C. leonina* Semper, and consequently I am inclined to think these 5 specimens from Pacific Grove represent Brandt's species *miniata*, which according to Ludwig has deposits like *leonina*. But the presence of interambulacral pedicels makes me doubtful. If these are *miniata*, and the large ones previously reported is *albida* Selenka, as seems probable, there Ludwig is wrong in supposing them to be identical. If these specimens are not *miniata* they probably represent a new species, but the matter can only be settled by a large series of specimens from Alaska and California.

The 3 specimens of *Thyone* clearly represent a new species, to which I have given the name *rubra*, on account of its color. Its characteristics follow:

Thyone rubra nov. sp. Monterey Bay, California, near shore.

Color in life, "reddish-pink on back, white beneath"; in alcohol, rust-colored on back, whitish beneath. Length 20 mm; diameter 5 mm. Body almost cylindrical, uniformly covered with numerous pedicels; in only one specimen and then only at the ends of the body could rows on the ambulacra be distinguished. Pedicels provided with terminal plates. Tentacles 10, the 2 ventral much smaller. Anal teeth wanting. Radial pieces of calcareous ring with prominent posterior prolongations. Ge-

Fig. 1.

Fig. 2.

Fig. 3.



nitral glands short, thick and unbranched. Body wall more or less stiffened by the very numerous calcareous particles. In the deepest layer of the body wall these particles are symmetrical buttons with 4 holes and 2 knobs (Fig. 1) but as the outside is approached the

number of knobs and holes increases (Fig. 2) greatly and the center of the plate becomes elevated to form the broad, low spire of a very complex and peculiar table (Fig. 3). The deposits in the dorsal surface are very much larger than those in the ventral, and besides the deposits just described we find a few very large knobbed and perforated plates (Fig. 4). In the pedicels, the discs of the tables become elongated and the spires reduced to form the supporting rods (Fig. 5). The most interesting fact about this *Thyone* is that it is viviparous, the embryos

developing in the body cavity as in *Synapta vivipara* and *Chiridota rotifera*. The largest of the 3 individuals before me contained 10 young, the smallest of which is 2 mm in length the largest 7 mm. The former has 5 tentacles well developed and the alternating 5 are just appearing. The latter has 10 tentacles which have begun to branch. The other young ones are at various intermediate stages of development. In all 10, the calcareous ring is well developed but there are prominent anterior prolongations instead of posterior. None of the young have any pigment in the body wall. The smallest individual has no pedicels and only the first signs of a few calcareous particles. In a specimen 3 mm long, the pedicels of one ambulacrum have begun to appear. In the largest individual the body-wall is full of knobbed buttons and tables like those of the adult, and there are a dozen or more pedicels in each ambulacrum. There are

also 5 prominent anal teeth. Besides these specimens already referred to there are in the collection, 2 small Holothurians, 7 and 14 mm long respectively, pure white in color and with the pedicels confined to the ambulacra, which have calcareous particles similar to those of

this species and I presume they are the young, taken not long after birth. If that is the case, the young in this species are born when about one-third the length of the mother; they are then white and have the pedicels confined to the ambulacra; the color and increased number of pedicels are acquired with age.

But by far the most interesting Holothurian from California is a curious little species which fails to fit into any known genus and for which therefore I have formed the new genus *Thyonepsolus*. The origin of this name is obvious; it is suggested by the *Psolus*-like appearance of the animal combined with the *Thyone*-like character of the dorsal side. The description follows:

Thyonepsolus nov. gen. Tentacles 10. Ventral surface flattened to a sharply defined creeping sole on which the pedicels are arranged in 3 longitudinal series. Dorsal surface arched, covered with a very thick soft, loose skin and with numerous pedicels scattered quite uniformly over it. Mouth anteriorly, anus posteriorly, placed on dorsal side,

Fig. 4.

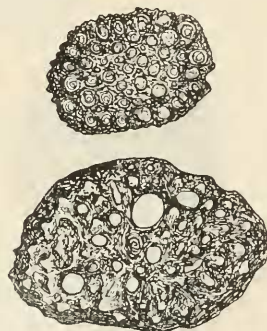
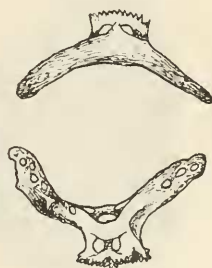


Fig. 5.



surrounded by plates more or less completely imbedded and hidden in the skin.

This genus differs from *Psolus* Oken in the presence of pedicels on the dorsal surface; from *Psolidium* Ludwig, in the shape of the body and in the fact that the pedicels are not confined to the ambulacra on any part of the dorsal surface; and from *Théelia* Ludwig in the number of tentacles, the absence of plates on the back and the fact that the dorsal appendages are apparently true pedicels.

Thyonepsolus nutriens nov. sp. (Fig. 6—14). On rocks along shore of Monterey Bay.

Color in life, "red"; in alcohol yellowish-white. Length 15 mm, breadth 8 mm, height 5 mm. Body depressed, ventral surface (Fig. 6) perfectly flat, dorsal surface (Fig. 7) flattened. Ventral surface with a thin stiff skin; dorsal surface with a very thick body wall, the inner

Fig. 6.

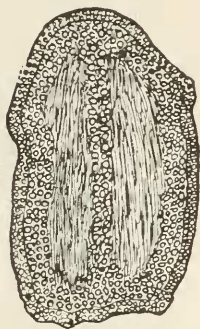


Fig. 7.

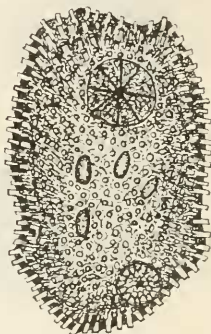


Fig. 8.



layer of which is thin and stiff, while the outer layer is thick and soft. Pedicels numerous, scattered irregularly all over the dorsal surface but arranged in 3 longitudinal series on the ventral side; the lateral series have 4 or 5 rows of pedicels, the median only 2 (Fig. 8). Tentacles apparently 8, but probably 10, seemingly of equal size. Calcareous ring moderate, without posterior prolongations. Anus surrounded by a number of small calcareous plates but these are largely concealed by the soft outer layer of skin. Calcareous particles of the body wall, very numerous. In the ventral skin, they consist of small perforated plates (Fig. 9). In the body wall of the dorsal side there are 3 distinct layers: 1) an inner layer of large fenestrated, knobbed ellipses or thick plates, more or less flattened (Fig. 10); these make up the stiff part of the dorsal skin and are often perforated for the passage of the pedicels, 2) a middle layer of large and small irregular plates more or less curved, perforated by many smooth holes which are largest near the

center (Fig. 11), 3) an outer layer of small reticulated cups with more or less widened margin (Fig. 12). The pedicels are provided with

Fig. 9.



Fig. 12.



Fig. 10.

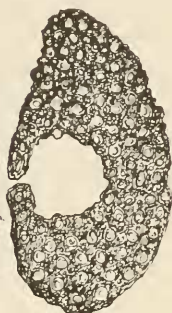
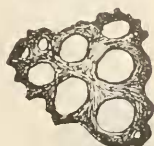
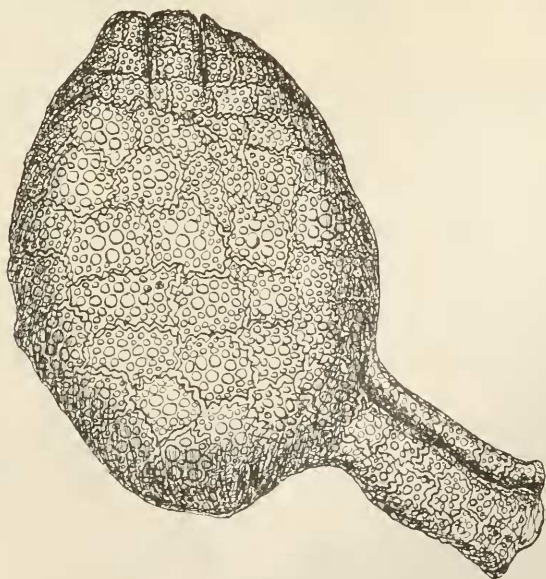


Fig. 11.



numerous curved plates like those in the body wall but there are no true supporting rods. The terminal plates are large. The most remarkable fact about this Holothurian is the way in which it cares for its

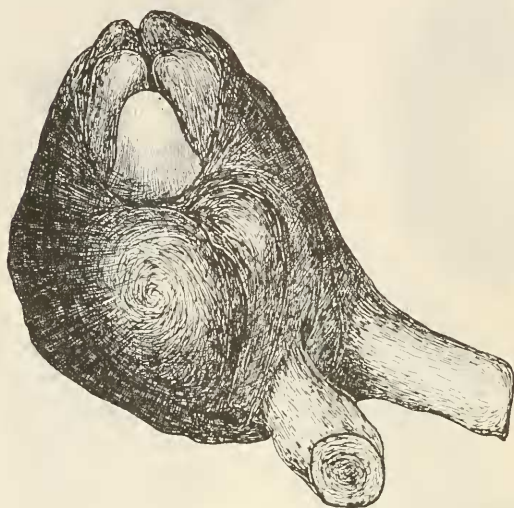
Fig. 13.



young. One of the 3 specimens had on its back, imbedded in the soft skin 4 small, ellipsoidal objects, which investigation showed were

young ones. These young are apparently of the same age and each is provided with a single pair of pedicels near the rear of the body which appeared to rest on the stiff inner skin of the mother's back. The wall of the pedicels as well as that of the body is filled with the characteristic calcareous plates (Fig. 13—14). The 5 primary tentacles are just

Fig. 14.



indicated. The figures will show plainly the shape and proportions of the young and their relation to the body of the mother (Fig. 8). This peculiar manner of caring for the young has suggested the specific name selected.

In conclusion, there follows a list of the Holothurians now known from the Pacific coast of America, north of Mexico, including the 2 just described, with the localities from which they are recorded and

some remarks as to their status. It is given in the hope that it may prove a stimulus to the study of this interesting but somewhat neglected group of the Pacific coast fauna.

- 1) *Chiridota discolor* Eschscholtz. Sitka.
- 2) *Synapta inhaerens* O. F. Müller. Puget Sound. Mendocino, Cal. Pacific Grove, Cal.
- S. albicans* Sel. is probably this species.
- 3) *Trochostoma arenicola* (Stimpson). San Pedro, Cal.
- 4) *Cucumaria albida* (Brandt), Sitka. "California". Pacific Grove, Cal. (?)

Perhaps identical with *C. populifer* (Stimpson).

- 5) *Cucumaria calcigera* (Stimpson). Pacific Grove, Cal.
- 6) - *Chronhjelmi* Thél. Vancouver's Island. Puget Sound. Pacific Grove, Cal.
- 7) *Cucumaria curata* Cowles. Pacific Grove, Cal.
- 8) - *frondosa* Gunner. San Francisco (Ayres). The occurrence of this species on the Pacific coast is very doubtful.
- 9) *Cucumaria lubrica* Clark. Puget Sound. Pacific Grove, Cal.

- 10) *Cucumaria miniata* (Brandt). Sitka. Pacific Grove, Cal. (?)
- 11) - *nigricans* (Brandt). Sitka.
Probably identical with *piperata* Stimpson.
- 12) *Cucumaria populifer* (Stimpson). Puget Sound.
- 13) - *quinquisemita* Selenka. Mendocino.
- 14) *Thyone rubra* nov. spec. Pacific Grove, Cal.
- 15) *Thyonepsolus nutriens* nov. gen., nov. spec. Pacific Grove, Cal.
- 16) *Psolus chitonoides* Clark. Puget Sound.
- 17) - *Fabricii* D. & K. Alaska.
- 18) - *squamatus* D. & K. Pacific Grove, Cal. (?)
- 19) *Stichopus californicus* (Stimpson). Puget Sound. Tomales Bay, Cal. Pacific Grove, Cal.
- 20) *Stichopus sitchaensis* (Brandt). Sitka.
A very doubtful species.
Olivet College, Michigan, Jan. 1901.

7. *Mus rattus* L. im Europäischen Russland.

Von B. M. Shitkov, Assistent am zoolog. Museum der Universität Moskau.
eingeg. 18. Februar 1901.

In der zweiten Hälfte des verflossenen Jahres wurde an zwei Stellen des Europäischen Rußland ein Fund von höchstem Interesse in zoogeographischer Beziehung gemacht. Im Moskauer Gouvernement einerseits, und in Livland andererseits wurden fast gleichzeitig einige Exemplare der Hausratte (*Mus rattus* L.) gefangen und dem zoologischen Museum der Universität Moskau eingeliefert. Das erste, vom Herrn Prof. N. Zograff dem Museum übergebene Exemplar, wurde in dessen Besetzung »Mytniki«, welche sich ungefähr eine deutsche Meile von der Stadt Rusa im Moskauer Gouvernement befindet, gefangen. (Durch die Besetzung fließt der Fluß »Osernaja«, der in den Fluß »Rusa«, einen Nebenfluß des Moskaustroms, hineinfällt.) Das gefangene erwachsene Weibchen war nicht das einzige vorhandene Exemplar. Bevor dieses dem Herrn Prof. Zograff vor Augen kam, der natürlich sofort Schritte zur Conservierung des seltenen Fundes that, hatten die Dienstboten mehrere solcher Hausratten eingefangen, getötet und fortgeworfen.

Die zwei anderen großen Exemplare der Hausratte schickte mir mein Freund S. A. Buturlin. Sie waren von ihm im Kellergeschoß eines Hauses im Flecken Marienburg in Livland gefangen worden, am 17./30. October und 20. October (2. November) 1900. Vor Kurzem theilte er mir mit, daß von ihm im selben Kellergeschoß am